

Voltage, Current, and Resistance:

## • Voltage:

- Difference in electric potential
- Objects (or parts of the same object) have different amounts of charge, creating a potential difference → called voltage
- Named after Alessandro Volta (he created the 1st battery!)
- A negative charge (electrons) "wants" to move away from other negative charges.
- These repulsive forces get stronger as the electrons get closer together.
- Electrons flow from negative to positive
  - $\emptyset V \rightarrow +5V$
  - $-5V \rightarrow \emptyset V$
  - $-5V \rightarrow +5V$
- Voltage provides the (potential) energy that pushes and pulls electrons through the circuit
- Voltage is measured in volts (V)

- Batteries:

- Have different voltages, so pushes electrons with different strengths
- Have positive and negative terminals
- Electrons go from negative to positive

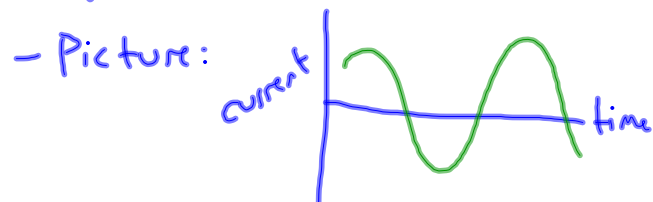
## • Current:

- Flow of electric charge (electrons)
- Electrons go from negative to positive, but CURRENT goes from positive to negative
- Flow of electrons  $\rightarrow$  negative to positive  
Current  $\rightarrow$  positive to negative
- Two types of current:
  - Direct Current (DC):
    - Electrons move from one terminal to another in the same direction



- Example: Battery

- Alternating Current (AC):  
Current alternates directions in a given time interval



- Example: Generator

- Resistance:

- Opposition to electron movement
- Change electrical energy into thermal energy and light
- Resistance is caused by internal friction of the object
- Conductors have low resistance
- Insulators have high resistance
- Two ways to increase resistance:
  1. Make the wire longer.
  2. Make the wire thinner.

$$y = mx + b$$

$$V = RI + \phi$$

